REMARKS

Claims 1-48 are present in this application. Claims 1, 11, 15, and 18 are independent. Claims 41 to 48 have been added.

Statement of Summary of the Interview

Applicants wish to thank the Examiner and her Supervisor for conducting the interview on November 9, 2005. It is believed that as a result of the interview, features of the present invention are better understood.

In addition, as a result of the interview, it is Applicants' understanding that the position of the Examiner and Supervisor is that Katz together with Fortune inherently teach simultaneous reception of a signal wave from a plurality of propagation paths including a line of sight propagation path to the transmitter and from at least one indirect propagation path.

Applicants address this issue below.

Claim Rejection – 35 U.S.C. § 103(a); Fortune, Katz, Hayashikura

Claims 1-11, 14-23, 28-40 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,450,615 ("Fortune") in view of U.S. Patent No. 6,643,526 ("Katz") and U.S. Patent No. 5,654,715 ("Hayashikura"). Applicants traverse this rejection.

Summary of the Present Invention

A described in the present specification, the present invention is a solution to the problem of

multi-path signal reception, including time delayed multi-path signal reception, that has been found to occur when antennas are used for transmission of millimeter band radio waves. Conventional local area networks transmit waves using omnidirectional antennas as the transmitting and receiving antennas. Using omnidirectional antennas enables wireless devices to be placed in most locations throughout the signal range of the transmitted signal. Using omnidirectional antennas enables use of portable wireless devices within a range of a base station.

Transmission of millimeter band radio waves is considered an alternative to transmission of conventional frequency band radio waves using omnidirectional antennas for indoor transmission, for example in local area networks. Millimeter band radio waves offer the capability of transmitting a much higher bandwidth of information, which would be useful for transmission of high-resolution video data, for example. However, millimeter band radio waves are highly susceptible to attenuation, and millimeter band radio waves are highly susceptible to absorption. Thus, known approaches for transmission of millimeter band radio waves in local area network applications, has been to use directional antennas for both the transmitting antenna and the receiving antenna in order to ensure a sufficient signal is received by the receiving antenna. This is done by arranging the transmitting antenna and the receiving antenna such their main beam is in a direction of a line of sight path. Also, the transmitting antenna is arranged such that side lobes are reduced as much as possible.

A problem known as multi-path occurs when a signal wave is received over multiple paths, due for example to a reduction in intensity, i.e., attenuation, of a wave that is reflected and due to partial absorption, as well as other reflection related losses. Due to multi-path, a receiver may

receive one transmitted signal wave from a direct path simultaneously with another previously transmitted signal wave from a reflected path. In addition, multi-path effects can occur as a result of reception of low intensity propagation paths. Applicants for the present invention have found that in the case of video transmission, the problem of time delayed multi-path leads to a ghosting effect in displaying the video (see present specification at page 8, paragraphs at lines 18-27, for a general description of the multi-path problem and that the system arrangement shown in Fig. 1 does not exhibit this problem). In other words, Applicants have found that direct transmission of millimeter band signal waves leads to multiple path signal waves being received time delayed from the direct signal wave (observed as a ghosting effect).

In addition, because of the problem of absorption in millimeter band radio waves, use of millimeter waves as a medium for transmission of video data has a problem that when an object passes through the path between the transmitting and receiving antennas, the transmission wave may be totally interrupted such that the signal will not be received by the receiving antenna for the period of interruption.

Thus, Applicants invention presents a solution to the problems of reception of millimeter band radio signal waves in an indoor environment. Applicants invention maintains use of directional antennas for transmission and reception of millimeter band radio waves, but in an arrangement than ensures that at least one propagation path will be received even in the case of interruption of a propagation path, and that when more than one propagation path is received they do not cause a substantial problem of ghosting due to time delayed multi-path effects.

Summary of the Claimed Subject Matter

Claim 1

Embodiments of claim 1 are directed to a millimeter band signal transmitting/receiving system (e.g., millimeter band signal transmitting/receiving system shown in Figures 1-4), comprising:

a stationary transmitter transmitting a millimeter band signal wave (e.g., transmitter 1 and antenna 31);

a propagation path forming portion forming at least one indirect propagation path (e.g., reflected wave 5) for propagation of said millimeter band signal wave; and

a stationary receiver (e.g., receiver 2 and antenna 32) including a receive antenna having a main lobe and a side lobe receiving said millimeter band signal wave simultaneously from a plurality of propagation paths including a line of sight propagation path (e.g., direct wave 4) to said transmitter and said at least one indirect propagation path (e.g., reflected wave 5), and receiving said millimeter band signal wave from at least one of said plurality of propagation paths (present specification at page 9, lines 5-15; see also, Fig. 2).

The rejection is deficient because no evidence has been provided to show that Katz, Fortune, and Hayashikura inherently show simultaneous reception of a millimeter band signal wave over a plurality of propagation paths, as required by the claims.

An allegation has been made that Fortune and Katz inherently suggest that signals would be received by a receiving antenna to some extent in a simultaneous manner. Applicants submit

that such an allegation does not apply at least in the case of transmission of millimeter band signal waves, as evidenced in Applicants' disclosure.

Legal Requirements for Inherency

> To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. <u>Inherency, however, may not be established by probabilities or possibilities</u>. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999).
>
> "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the alleged inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).

As can be seen in the present specification, Applicants have found that in conventional direct transmission of a millimeter band signal wave between a transmitter and a receiver, ghosting, i.e., time delayed signals, occurs caused by multiple paths (specification at page 8, lines 18 to 26). The system arrangement of the present invention, however, did not have this problem. In particular, Applicants found that an arrangement where the reflected wave is the main lobe and the direct wave is the side lobe of the transmitting/receiving antenna, the intensity of the direct wave with respect to the reflected wave fall within a suitable range, and the direct wave and reflected wave are simultaneously received by the receiver (specification at page 9, lines 4 to 13).

There is no indication that either Katz or Fortune address the problem of ghosting. Katz and Fortune each teach calculations that passively take into account the properties of the received waves such as multipath effects. Thus, Applicants submit that Katz and Fortune teach at most a conventional arrangement of transmitter and receiver for directional transmission of a signal wave. There is no evidence that Katz or Fortune would provide an arrangement other than a conventional direct transmission arrangement in the case of transmission of millimeter band signal waves. As disclosed in the present application, it is not an inherent property of directional antennas to simultaneously receive a millimeter band signal wave from a line of sight propagation path and a reflected propagation path, especially in the case where the main lobe is the direct path and the side lobe is reduced as much as possible to a low or negligible intensity as shown in Katz.

Accordingly, Applicants submit that the rejection is deficient in that it fails to provide evidence of inherency of simultaneous reception of a signal wave over a plurality of propagation paths, including an indirect propagation path, in a transmitting/receiving system, as recited in the claims. For at least this reason, Applicants request reconsideration and withdrawal of the rejection.

<u>The rejection is deficient because the cited references, either alone or in combination, fail to teach or suggest each and every claimed element</u>

> To establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. <u>In re Royka</u>, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that

> claim against prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). See M.P.E.P. § 2143.03.

The rejection alleges that Fortune teaches "a stationary antenna at 212 including a receive antenna 215 receiving the signal wave simultaneously a plurality of the signal waves from a plurality of propagation paths including a line of sight propagation path 217 and the at least one indirect propagation path 219, and receiving the signal wave from at least one of the plurality of propagation paths (the rejection generally refers to an entire column for teaching this element of the claim at col. 5, line 43 – col. 6, line 67). The rejection further alleges that Fortune teaches that different types of antennas can be used to calculate path losses (col. 6, lines 52-56).

The rejection relies on Katz for teaching an antenna having a main lobe and a side lobe, and alleges that it would have been obvious to combine Fortune, Hayashikura, with Katz because it is known to have a main lobe and a side lobe in order to receive multipath signals from lobes other than the main beam as suggested by Katz (Office Action at page 4). The rejection relies on Hayashikura for allegedly teaching transmission and reception of a millimeter band signal wave, and in particular alleges that use of millimeter band signal wave is merely an alternative frequency in a higher frequency band than usual, and depends on the available spectrum resource of the system (Office Action, paragraph bridging pages 3 and 4).

Applicants submit that even if teachings of Fortune, Hayashikura, and Katz were to be combined, which Applicants disagree, the combination does not teach or even suggest the claimed invention. As pointed out above, the claimed invention is a solution to the multi-path problem that is exagerated in the case of reception of millimeter band signal waves. None of the

cited references address this problem, and much less suggest a solution to the problem consistent with the present claimed invention. In addition, it is noted that the claimed invention is directed to a receive antenna in a millimeter band signal transmitting/receiving "system." The rejection appears to overlook this perspective.

First, it is noted that millimeter band signal waves have properties that are much different than conventional radio transmission frequencies. The millimeter frequency band is the highest frequency band before the infrared band and extends from 30 GHz to 300 GHz. Radio signals in this band are extremely prone to attenuation and absorption. Reflected signal waves can suffer from attenuation, which is a reduction in intensity of the signal wave due to energy loss and scattering of the propagation path. Similar to infrared light, when an object obstructs the millimeter band radio signal, the signal path may be absorbed and thus completely interrupted. Though Fortune's technique can take into account obstacles, Fortune does not specifically address the problem of absorption of millimeter band radio waves. Also, Fortune appears to take into account reflection losses, but does not offer measures to insure simultaneous reception with a reflected signal wave.

Second, as Applicants have disclosed in the present application, when antennas are arranged to transmit and receive millimeter wave band signal waves by a direct wave, a satisfactory communication is not obtained because of a serious affect of multiple paths (Specification at page 8, lines 18-22). Thus, Applicants have determined that at least in the case of millimeter band signal waves directed in a line-of-sight path between a transmitter and a receiver, propagation paths other than the direct path lead to the problem of multi-path. The

adverse effects of multi-path are particularly prevalent in millimeter band wave transmission because of absorption and attenuation.

Third, Katz teaches away from the claimed invention in that it accommodates multiple path effects and assumes a side lobe that is of low or negligible intensity, whereas the present invention substantially eliminates multiple path effects by, for example, an intensity of at least one side lobe that is substantially the same as the main lobe intensity in a transmitting antenna so that the received multiple propagation paths are of substantially the same intensity and are received simultaneously. Katz relies on multipath effects and other differences in order to unambiguously determine the direction of origination of a signal. Katz assumes a conventional low intensity side lobe. More importantly, Katz does not disclose transmission of millimeter band signal waves, which would have much greater losses than conventional radio frequency band signal waves.

More specifically, Katz teaches an antenna array that takes into account multipath effects, rather than as in the present invention, eliminate multipath effects. In Katz, differences in received signal waves due to multipath effects and time delays are taken into account as an approach to determining the direction from which a received signal has been received. In particular, Katz discloses an antenna array that receives eight versions of the same signal which are phase shifted with respect to one another (column 8, lines 33-36). In addition, with respect to reflected waves, the receiver takes into account that the versions of a signal may be time delayed with respect to each other (column 8, lines 42 to 53).

Fourth, Katz is not at all concerned with a specific system arrangement that would correct the problem of multipath effects for millimeter band signal waves. Instead, Katz relies on differences in received signal waves in determining direction of origination of a signal wave. If Katz's antenna were to be applied instead to receiving communication Katz's conventional direct transmission arrangement would likely suffer from the same problems disclosed by Applicants of unsatisfactory communication due to serious effects of multiple paths. As Applicants have pointed out, in the case of transmission and reception performed by a direct millimeter band signal wave, adverse effects such as ghosting occurs due to multiple paths.

Applicants have determined that in order to eliminate multipath effects and receive at least one reflected propagation path for a millimeter band signal, the receiving antenna can be positioned such that a side lobe is in a direct line-of-sight path with a side lobe of the transmitting antenna, and such that a main lobe is directed to an indirect reflected propagation path to the transmitting antenna, in such a manner that the plurality of propagation paths for the same transmitted signal wave will be received simultaneously. By having simultaneous reception of the propagation paths, Applicants have determined that there will be no adverse affect such as ghosting caused by multiple paths (specification at page 8, lines 23 to 27). In one aspect of the present invention satisfactory reception was achieved when the intensity of the reflected wave was greater by 3 decibels than the intensity of the direct wave, where the reflected wave is received by a main lobe of the receiving antenna (specification at page 9, lines 6-14).

It is noted that "intensity" is not synonymous with strength, amplitude, or level of a wave. Rather "intensity" is a measure of an energy flux over a period of time. Applicants have

determined that attenuation and absorption losses can be offset by sufficient intensity in order to obtain simultaneous reception of relatively equivalent intensity waves. In an alternative embodiment, Applicants have determined that reflection losses can be offset by a sufficient signal to noise ratio of the reflected main beam.

Applicants submit that each of Fortune, Hayashikura, and Katz relate to at most a line-of-sight propagation path between main lobes of transmitting and receiving antennas, and thus do not solve the problem of effects due to multiple paths. In addition, neither Katz nor Fortune address particular problems with transmission of millimeter band signal waves. Hayashikura merely shows reflection transmission/reception of millimeter band signal waves for purposes of distance measurement to an obstacle and does not address effects caused by multiple paths.

Thus, Applicants submit that Fortune, Hayashikura, and Katz, either alone or in combination, fail to teach a millimeter band signal transmitting/receiving "system" having an arrangement where a receive antenna receives a transmitted millimeter band signal wave simultaneously from a plurality of propagation paths including a line of sight propagation path to the transmitter and an indirect propagation path. At least for these reasons, Applicants submit that the rejection fails to establish prima facie obviousness, and requests that the rejection be reconsidered and withdrawn.

Claim 11

Summary of the Claimed Subject Matter

The claimed invention of claim 11, in preferred embodiments, is directed to a millimeter band signal transmitting/receiving system (e.g., millimeter band signal transmitting/receiving system shown in Fig. 5), comprising:

a plurality of stationary transmitters (e.g., transmitters 10 and 11, and associated antennas 31A and 31B); and

a stationary receiver including a receive antenna (e.g., receiver 20 and antenna 32) having a main lobe and a side lobe arranged to simultaneously receive a plurality of millimeter band signal waves output from said plurality of transmitters (e.g., present specification at page 13, lines 2-4),

said plurality of millimeter band signal waves being transmitted from said plurality of transmitters having a same frequency (present specification at page 13, lines 6-7).

> To establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). See M.P.E.P. § 2143.03.

The rejection states that Fortune teaches a plurality of signal waves transmitted from a plurality of transmitters having a same frequency "due to the same path length from the transmitter point 210." (Office Action at page 6.) The rejection points to sections in column 5 and 6 of Fortune as a basis for this statement.

Applicants submit that Fortune does not disclose frequency of transmission, and much less that the frequency of a plurality of transmitters is the same such that the receive antenna simultaneously receives the plurality of signal waves from the transmitters. Fortune merely states that free-space loss is a function of path length. Applicants submit that even if the path length were the same for a plurality of transmitters, that characteristic alone does not teach or suggest that the frequencies of each of the transmitters is the same.

Accordingly, Applicants submit that the rejection fails to establish *prima facie* obviousness for claim 11. Applicants request that the rejection be reconsidered and withdrawn.

Claim 15

Similar to claim 1, claim 15 also recites a millimeter band signal transmitting/receiving system including "a stationary receiver including a receive antenna having a main lobe and a side lobe receiving said millimeter band signal wave simultaneously through a plurality of propagation paths." Thus, the same argument made in the above for claim 1 applies as well to claim 15.

Accordingly, Applicants submit that the rejection fails to establish *prima facie* obviousness for claim 15. Applicants request that the rejection be reconsidered and withdrawn.

Claim 18

Summary of the Claimed Subject Matter

The claimed invention of claim 18, in preferred embodiments, is directed to a millimeter

band signal transmitting/receiving system (e.g., millimeter band signal transmitting/receiving system shown in Figures 1-6), comprising:

at least one stationary transmitter (e.g., transmitter 1, or transmitters 10 and 11) transmitting a millimeter band signal through an associated transmit antenna (e.g., antenna 31, or antennas 31A and 31B) along a plurality of propagation paths (direct wave 4 and reflected wave 5, D wave, or E wave) of said millimeter band signal formed by said associated transmit antenna including a line of sight propagation path between said associated transmit antenna and a receive antenna (e.g., direct wave 4, D wave, or E wave);

a stationary receiver (e.g., receiver 2 or receiver 20) receiving the millimeter band signal through said receive antenna having a main lobe and a side lobe (e.g., disclosed in the present specification at page 9, lines 5-8),

wherein, in a normal state when said line of sight propagation path is unobstructed, said receiver receives the millimeter band signal through each of the plurality of propagation paths including said line of sight propagation path (present specification at page 8, lines 11-13), and

wherein, in an obstructed state when said line of sight propagation path is obstructed, said receiver receives the millimeter band signal through each of the plurality of propagation paths except said line of sight propagation path (e.g., see Fig. 2, present specification at page 8, lines 29-30).

The rejection states that Fortune's transmit antenna 211 teaches the claimed transmit antenna, and that propagation paths 217 and 219 teach the claimed plurality of propagation paths formed by the transmit antenna. The rejection states that Fortune's receive antenna 215 teaches

the claimed receive antenna. Furthermore, the rejection states that a section in Fortune pertaining to the recursive analysis approach to predicting propagation teaches the claimed "normal state" and "obstructed state." In particular, with respect to the "normal state" the rejection relies on a section in Fortune which states that,

> "The propagation prediction process begins with the calculation of a received power value for a direct path 217 from transmitter point 210 to receiver point 212. This direct path 217 is the straight-line path from the transmitter point 210 to the receiver point 212, which may or may not pass through a surface such as a wall, but which does not include reflections from surfaces." (Column 5, lines 43-49.)

The rejection also points to a statement in Fortune which discusses the alternative roles at each transmitter point and receiver point, as teaching the function of the claimed receiver in the normal state (referring to column 6, lines 62-63). Applicants do not understand why this section is referred to.

With respect to the "obstructed state," the rejection relies on a section in Fortune which states that,

> "Transmission losses result when the propagation path passes through an obstruction such as a surface. This transmission loss is determined and normalized in accordance with the recursive procedures set forth above and described in greater detail in the aforementioned Ramo textbook. For example, if the direct path does not include any obstacles, the normalized transmission loss is 1, whereas if an obstacle completely blocks an RF signal, the normalized transmission loss is 0. The total propagation loss for the direct path is calculated as the product of the free-space loss and the normalized transmission losses. The power received at the receiver point 212 from the direct path may be determined from the total direct path propagation loss. These calculations are well known to those skilled in the art, and are performed using

> conventional methods such as those set forth in the Ramo reference. Next, received power for all one-reflection paths 219 are calculated, followed by all paths involving two reflections." (Column 5, line 57, to column 6, line 7.)

The rejection relies on a section in Fortune for teaching the function of the claimed receiver in the obstructed state, which states that,

> "Note that reflection path losses and direct path losses can be scaled for different types of antennas simply by multiplying the total calculated path loss by the antenna power gain in the direction of interest." (Column 6, lines 52-56.)

Applicants assume that the purpose of the later section is to show that the receive antenna of Fortune can be alternative types of antennas, and to take into account an alternative type of antenna, the power calculation involves antenna power gain for the type of antenna.

In any case, Applicants submit that Fortune fails to teach a stationary antenna that has both a normal state and an obstructed state as recited in claim 18. For example, Fortune fails to teach temporary blockage of a received signal. Unlike Fortune, the present claimed invention includes, among other things, a stationary transmitter having an associated transmit antenna transmitting a signal along a plurality of propagation paths including a line of sight propagation path to a receive antenna of a stationary receiver. In a normal state, the line of sight propagation path between the stationary transmitter and the stationary receiver is unobstructed. In an obstructed state, the line of sight propagation path between the stationary transmitter and the stationary receiver is obstructed.

In Fortune, on the other hand, for a given transmitter point 210 to a given receiver point 212, a total direct path propagation loss will be calculated. The total propagation loss would be based on factors including path length (free-space loss), losses due to a path through an obstruction, or due to obstacles. In other words, for a given pair of points used in the path prediction, there is only one state, which could be any of a continuum of unobstructed path to an obstructed path depending on obstructions and/or obstacles along the path. (e.g., see examples illustrated in Figures 7-9).

In addition, Fortune discloses a technique for prediction of RF propagation, and does not disclose a final communication system design. Thus, Applicants submit that a particular transmitting/receiving system such as that of the present claimed invention is not disclosed in Fortune. Fortune does not appear to disclose a resulting location of a transmitter and a receiver that would exhibit the properties of the claimed invention. In other words, Applicants submit that there are more factors involved in the present invention than merely replacing the receive antenna with an antenna having a main lobe and a side lobe, and merely using a millimeter band signal wave instead of a conventional RF signal, as alleged in the rejection.

The rejection states that Fortune doesn't specifically disclose a millimeter band transmitting/receiving system, and instead relies on the teachings of Hayashikura. However, Hayashikura also does not at least teach the claimed "normal state" and the claims "obstructed state" for a stationary received, and thus, does not make up for the deficiency in Fortune.

The rejection relies on Katz for teaching that it is notoriously well known in the art that a main lobe and a side lobe is part of a conventional directional antenna. Applicants agree that an

antenna having a main lobe and a side lobe constitutes a directional antenna. However, Applicants submit that Katz merely indicates the obviousness of the claimed element, and that Katz in combination with Fortune and Hayashikura fail to teach the claim as a whole. Applicants submit, for example, that Katz, Fortune, and Hayashikura fail to suggest a receive antenna having a main lobe and a side lobe that, together with a stationary transmitter having a transmit antenna, functions in both a normal state and an obstructed state as in the present claimed invention.

Accordingly, Applicants submit that the rejection fails to establish *prima facie* obviousness for claim 18. Applicants request that the rejection be reconsidered and withdrawn.

Claims 38, 39 and 40

Summary of the Claimed Subject Matter

The claimed invention of claim 38, in a preferred embodiment, is directed to the millimeter band signal transmitting/receiving system of claim 1, wherein said at least one indirect propagation path is formed in a main lobe of a transmit antenna (present specification at page 9, lines 5-8).

The claimed invention of claim 39, in a preferred embodiment, is directed to the millimeter band signal transmitting/receiving system of claim 1, wherein said line of sight propagation path is formed in a side lobe of a transmit antenna (present specification at page 9, lines 5-8).

The claimed invention of claim 40, in a preferred embodiment, is directed to the millimeter band signal transmitting/receiving system of claim 15, wherein said line of sight propagation path is

formed in a side lobe of a transmit antenna (present specification at page 9, lines 5-8).

As has been disclosed in the present specification, Applicants have found that by providing a transmitter and receiver such that the direct wave propagation path and the reflected wave propagation path are simultaneously received by the receiver that good reception is received whether the direct wave propagation path is obstructed, or not. In other words, Applicants' invention ensures reliable reception of at least one propagation path for a signal wave without suffering from the adverse effects from multiple paths. In a preferred embodiment, the present invention provides simultaneous reception of propagation paths for the same signal wave by an arrangement where the reflected propagation path and direct propagation path are a main lobe and a side lobe of the transmitting/receiving antenna, respectively (page 9, lines 5-8). In other words, unlike the known conventional wireless LAN which relies on a line of sight propagation path for the transmitted signal, the present invention arranges the antennas such that a reflected propagation path is formed in a main lobe of a transmit antenna, whereas the line of sight propagation path is instead formed in a side lobe of the transmit antenna.

Applicants submit that Fortune is completely silent with respect to an arrangement for a directional transmit antenna. With respect to claim 38, the rejection admits that Fortune, as well as Hayashikura do not specifically disclose the at least one indirect propagation path is formed in a main lobe of a transmit antenna. Instead, the rejection relies on Katz for making up for the deficiency.

Though Katz does appear to teach the principle that a directional antenna has a main lobe, Applicants submit that Katz fails to teach formation of an "indirect propagation path" for a millimeter band wave in a main lobe of a transmit antenna.

With respect to claims 39 and 40, though Katz does appear to teach the principle that a directional antenna may have a side lobe, Applicants submit that Katz fails to teach formation of a line of sight propagation path in a side lobe of a transmit antenna in the context of a transmitting/receiving system including a receiving antenna receiving a millimeter band signal wave simultaneously from a plurality of propagation paths. The rejection alleges that it would have been obvious to transmit an indirect propagation path from a side lobe in order to lessen the congestion and interference in the side lobes receiving indirect signals as suggested by Katz (col. 8, lines 28-41).

Katz does appear to mention that a signal may be received from a side lobe (column 8, line 28-29). However, Katz does not disclose that the side lobe of the transmit antenna would be directed to a reflected propagation path in such a manner that a receive antenna will simultaneously receive the signal wave in the reflected propagation path from the side lobe with the same signal wave in a line of sight propagation path.

As Applicants have determined, in the case of millimeter band signal wave transmission performed by a direct wave, the communication is unsatisfactory and ghosting caused by the multiple paths occurs. In order to insure simultaneous reception of a millimeter band signal wave from a plurality of propagation paths including a reflected propagation path, without adverse effects due to multiple paths, the line of sight propagation path is produced by a side lobe of a

transmitting antenna. Thus, the present invention does not lessen interference from side lobes as taught by Katz, but intentionally transmits a line of sight signal wave from a side lobe in order to insure that a satisfactory communication is obtained without adverse effects from the multiple path signal waves.

Accordingly, Applicants submit that the rejection fails to establish *prima facie* obviousness. Applicants respectfully request that the rejection be reconsidered and withdrawn.

Claim Rejection - 35 U.S.C. § 103: Kagami

Claims 12, 13, 24-26 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Fortune, Hayashikura, and Katz, and further in view of U.S. Patent 5,479,443 ("Kagami"). Applicants respectfully traverse this rejection.

Claims 12, 13

Summary of the Claimed Subject Matter

Claim 12 is directed to a millimeter band signal transmitting/receiving system of claim 11, wherein each of a plurality of transmitters includes a local oscillator oscillating at a prescribed local oscillation frequency for generating the signal wave at the same frequency (an example of the claimed arrangement is shown in Figure 5).

Claim 13 is directed to the millimeter band signal transmitting/receiving system of claim 12, wherein the local oscillators are in synchronization with each other.

Thus, the arguments in the above for claim 11, apply as well to claims 12 and 13.

The rejection relies on Fortune for teaching a plurality of stationary transmitters and stationary receiver of claim 11. Kagami is relied on for teaching the additional claimed elements recited in claims 12 and 13.

Kagami is directed to a digital radio-relay system having a transmitting terminal station and at least one repeater station (Abstract). Kagami discloses wherein the system includes a transmitting terminal station 320 having a pair of modulators 324-1 and 324-2 coupled with a pair of transmitters 322-1 and 322-2 (Figure 10). The transmitters 322-1 and 322-2 are supplied with a common reference frequency by a common oscillator 321, such that a horizontal polarized wave is transmitted in-phase with a vertical polarized wave (column 9, lines 42-47). Each transmitter has a phase lock oscillator, a frequency mixer and a high power amplifier. A non-regenerative repeater station 300 has an antenna 310 for receiving the H polarized wave and V polarized wave.

Applicants submit that Kagami fails to make up for the deficiency in Fortune of teaching a stationary receiver with a receive antenna having a main lobe and a side lobe arranged to simultaneously receive a plurality of propagation paths for millimeter band signal waves. Thus, at least for this reason, Applicants submit that the rejection fails to establish *prima facie* obviousness for claims 12 and 13. Accordingly, Applicants request that the rejection be reconsidered and withdrawn.

Claims 24, 25, 26

Claim 24 is directed to a millimeter band signal transmitting/receiving system of claim 18.

Claim 25 is directed to a millimeter band signal transmitting/receiving system of claims 18 and 24, wherein each of a plurality of transmitters includes a local oscillator oscillating at a prescribed local oscillation frequency for generating the signal wave at the same frequency (an example of the claimed arrangement is shown in Figure 5).

Claim 26 is directed to the millimeter band signal transmitting/receiving system of claim 25, wherein the local oscillators are in synchronization with each other.

Thus, the arguments in the above for claim 18, applies as well to claims 24, 25 and 26.

The rejection relies on Fortune for teaching a plurality of stationary transmitters and stationary receiver of claim 18. Kagami is relied on for teaching the additional claimed elements recited in claims 25 and 26.

Kagami is directed to a digital radio-relay system having a transmitting terminal station and at least one repeater station (Abstract). Kagami discloses wherein the system includes a transmitting terminal station 320 having a pair of modulators 324-1 and 324-2 coupled with a pair of transmitters 322-1 and 322-2 (Figure 10). The transmitters 322-1 and 322-2 are supplied with a common reference frequency by a common oscillator 321, such that a horizontal polarized wave is transmitted in-phase with a vertical polarized wave (column 9, lines 42-47). Each transmitter has a phase lock oscillator, a frequency mixer and a high power amplifier. A non-

regenerative repeater station 300 has an antenna 310 for receiving the H polarized wave and V polarized wave.

Applicants submit that Kagami fails to make up for the deficiency in Fortune of teaching a stationary receiver with a receive antenna having a main lobe and a side lobe arranged to receive a millimeter signal from associated transmit antennas by separate line of sight propagation paths. Thus, at least for this reason, Applicants submit that the rejection fails to establish *prima facie* obviousness for claims 24, 25 and 26. Accordingly, Applicants request that the rejection be reconsidered and withdrawn.

Claim Rejection – 35 U.S.C. § 103: Evans

Claim 27

Claim 27 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Fortune, Hayashikura, and Katz as applied to claim 18, in view of U.S. Patent 5,920,813 ("Evans"). Applicants respectfully traverse this rejection.

Claim 27 is directed to a millimeter band signal transmitting/receiving system as recited in claim 18 wherein the signal is a video signal.

The argument in the above for claim 18 applies as well to claim 27.

The rejection admits that neither Fortune nor Hayashikura disclose a video signal. Instead, the rejection relies on Evans for teaching a video signal.

Applicants submit that claim 27 is directed to more than just a particular type of signal. Applicants submit that the rejection fails to treat the obviousness of the claim as a whole.

Claim 27 is directed to, among other things, at least one stationary transmitter transmitting a millimeter band video signal through an associated transmit antenna along a plurality of propagation paths of said millimeter band signal formed by said associated transmit antenna including a line of sight propagation path between said associated transmit antenna and a receive antenna; a stationary receiver receiving the millimeter band video signal through said receive antenna having a main lobe and a side lobe.

Evans is directed to a cellular video distribution system. Some of the disclosed embodiments include omni directional transmitters (Figures 1-5 and 7). However, Evans discloses that such disclosed embodiments can be subject to fading, interference and/or blocking of the transmitted signal (with respect to Figure 6: column 8, lines 9-12, as well as the paragraph at lines 13-47). For example, a subscribing receiver (R30) may be subject to multi-path propagation causing severe signal fading. In order to reduce or avoid such problems, Evans states that the omni directional transmitters can be replaced with directional transmitters carefully sited at nodes around the periphery of respective cells, i.e., edge-fed instead of center-fed (with respect to Figure 9, column 8, lines 48-55). The subscribing receiver is disclosed as being for restoring signal information (column 5, lines 53-55) and includes a capability to feed back information to the transmitter (column 4, lines 57-64; column 6; column 8, lines 25-29).

Evans discloses that reflections from buildings, ground, etc. lead to poor signal reception (column 8, lines 13-23). To solve this problem Evans discloses use of directional transmitters. Thus, Applicants submit that Evans does not make up for the deficiency in Fortune and Hayashikura, of failing to teach or suggest at least the claimed "normal state" and "obstructed

state" for a receiver receiving millimeter band signals through a receive antenna having a main lobe and a side lobe.

Accordingly, Applicants submit that the rejection fails to establish *prima facie* obviousness for claim 27 as a whole. Applicants request that the rejection be reconsidered and withdrawn.

New Claims

Claims 41 to 48 have been added, which depend on claims 1 and 15. At least for the reasons above for claims 1 and 15, Applicants submit that new claims 41 to 48 are patentable as well.

Conclusion

In view of the above amendment, Applicants believe the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert W. Downs (Reg. No. 48,222) at the telephone number of (703) 205-8000, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Dated: November 14, 2005

Respectfully submitted,

By [signature]

Charles Gorenstein
Registration No.: 29,271
BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 Gatehouse Road
Suite 100 East
P.O. Box 747
Falls Church, Virginia 22040-0747
(703) 205-8000
Attorney for Applicants

RCW